

Patent Claims

1. Tube bundle heat exchanger, having at least one channel (4, 5) that carries a heating or cooling medium, in particular, a heating gas, whereby the tubes (3) of the tube bundle (2) extend essentially axis-parallel to the channel longitudinal axis (6) through the channel (4, 5), and the heating or cooling medium is directed through rings (9) and discs (10), which are arranged on and fastened to the jacket walls (7, 8) respectively of the channel (4, 5) in an alternating fashion, in a zigzag pattern as seen in the axial direction of the channel (4, 5), which exhibits an essentially annular cross section, characterized in that at least one channel (4, 5) the rings (9) and discs (10) accommodate and position all the tubes (3) of one channel (4, 5), each by means of cylindrical recesses (11), and the perimeter contour (12) of the rings (9) and discs (10) on the medium flow-through side (13) follow the mid-points (14, 15) of the outermost or innermost tube bundle tubes (3), whereby the perimeter contour (12) includes a web (16) that surrounds all of the outermost or innermost tubes (3).
2. Tube bundle heat exchanger according to claim 1, characterized in that the width (B) of the web (16) as the distance between the outer wall of the tube (3) and the perimeter contour (12) remains at least partially constant.
3. Tube bundle heat exchanger according to claim 1 or 2, characterized in that the width (B) of the web (16) is between 3 and 10 mm.
4. Tube bundle heat exchanger according to claim 1 or 2, characterized in that the width (B) of the web (16) is less than 3 mm.

-14-

5. Tube bundle heat exchanger according to one of the claims 1 through 4, characterized in that the perimeter contour (12) at least partially follows the outer contour of the outermost or innermost tubes (3) in undulating fashion.
6. Tube bundle heat exchanger according to one of the claims 1 through 5, characterized in that the perimeter contour (12) runs at least partially parallel to an imaginary line connecting two or more outer or inner tube mid-points (14, 15).
7. Tube bundle heat exchanger according to one of the claims 1 through 6, characterized in that if more than one channel (4, 5) is present, they are arranged concentric with each other.
8. Tube bundle heat exchanger according to claim 7, characterized in that if more than one channel (4, 5) is present, the rings (9) and discs (10) that are designed with the perimeter contour (12) and accommodate all of the tubes (3) are arranged in the outer channel (5) or the outer channels.
9. Tube bundle heat exchanger according to one of the claims 1 through 8, characterized in that the tube bundle tubes (3) are designed as U-tubes or straight tubes.
10. Tube bundle heat exchanger according to one of the claims 1 through 9, characterized in that the rings (9) and/or discs (10) are designed with a crescent shape.
11. Tube bundle heat exchanger according to one of the claims 1 through 10, characterized in that on the cross-section side, the tubes (3) can be arranged within the channel 4, 5 in a spacing or structure with a triangular or square or other geometrical shape.